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Calorimetric study approach for crude oil combustion in the presence of clay as catalyst

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Abstract

© 2016 Taylor & Francis Group, LLC.In this research, the effect of heating rate and different clay concentrations on light and heavy crude oils in limestone matrix was investigated by differential scanning calorimeter (DSC). In DSC experiments, two main distinct reaction regions were identified in all of the crude oil + limestone matrix + catalyst, known as low- and high-temperature oxidation respectively. It was observed that addition of clay to porous matrix significantly affected the thermal characteristics and kinetics of different origin crude oils. The Borchardt and Daniels and ASTM kinetic methods were used to determine the kinetic parameters of the samples. It was observed that activation energies generated for the high-temperature oxidation region for crude oil and crude oil + clay mixtures were in the range of 148–370 kJmol−1 for the Borchardt and Daniels method and 51–253 kJmol−1 for ASTM methods.

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Keywords

Catalyst, clay, combustion, crude oil, differential scanning calorimeter, kinetics